

Sensory profile of gluten-free breads formulated with *Neltuma affinis* powders

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Introduction & Aim

Over the last years there is a growing demand of gluten-free (GF) bakery products; however challenges related to its nutritional profile and sensory acceptance is still a challenge. In general, consumers with gluten-related disorders express dissatisfaction mainly associated with the flavour, appearance, texture, and shelf life. In this context, *Neltuma affinis* is an underutilised Latin-American native legume species with high dietary fibre content ($>53\pm6\%$) and good hydration properties, and could be considered a functional novel ingredient for GF bread making. The aim of this study was to assess the acceptability and sensory profile of GF breads formulated with powders obtained from the dry milling of different anatomic fractions -endocarp-seed (ESP) and exocarp-mesocarp (EMP) of *N. affinis* fruit.

Two formulations were evaluated: F1 with 20% ESP and, F2 with 20% ESP and 2.4% EMP, as a partial replacement of rice flour and starch corn. Bread samples were analysed after 24 hours of storage at 25 °C and 70% relative humidity. Sensory characterisation was carried out using Check All-That-Apply (CATA) and Just-About-Right (JAR) methods, in gluten related disorders (26%, N= 27) and general consumers (74%, N=78). Penalty analysis was used to determine whether JAR classification for a specific attribute was associated with a drop in overall acceptability of >1 in $>20\%$ of consumers' responses

Method

Results & discussion

CATA analysis revealed differences ($p < 0.05$) between formulations. F1 was associated with descriptors such as “tasty”, “light crumb”, “soft” and “smooth”, whereas F2 was described as “moist”, “elastic”, “gummy”, and “airy crumb” (Figure 1).

F1 presented an overall acceptability score of 7 ± 2 on a 9-point hedonic scale, with “too little flavour” being the most penalising JAR attribute ($p < 0.0001$); in contrast, F2 scored 6 ± 2 , and was penalised by “too much colour and flavour” ($p = 0.003$; $p < 0.0001$, respectively). Therefore, the sensory profile of F1 could be improved by enhancing the flavour intensity, and reducing the excessive colour and flavour in F2 (Figure 2)

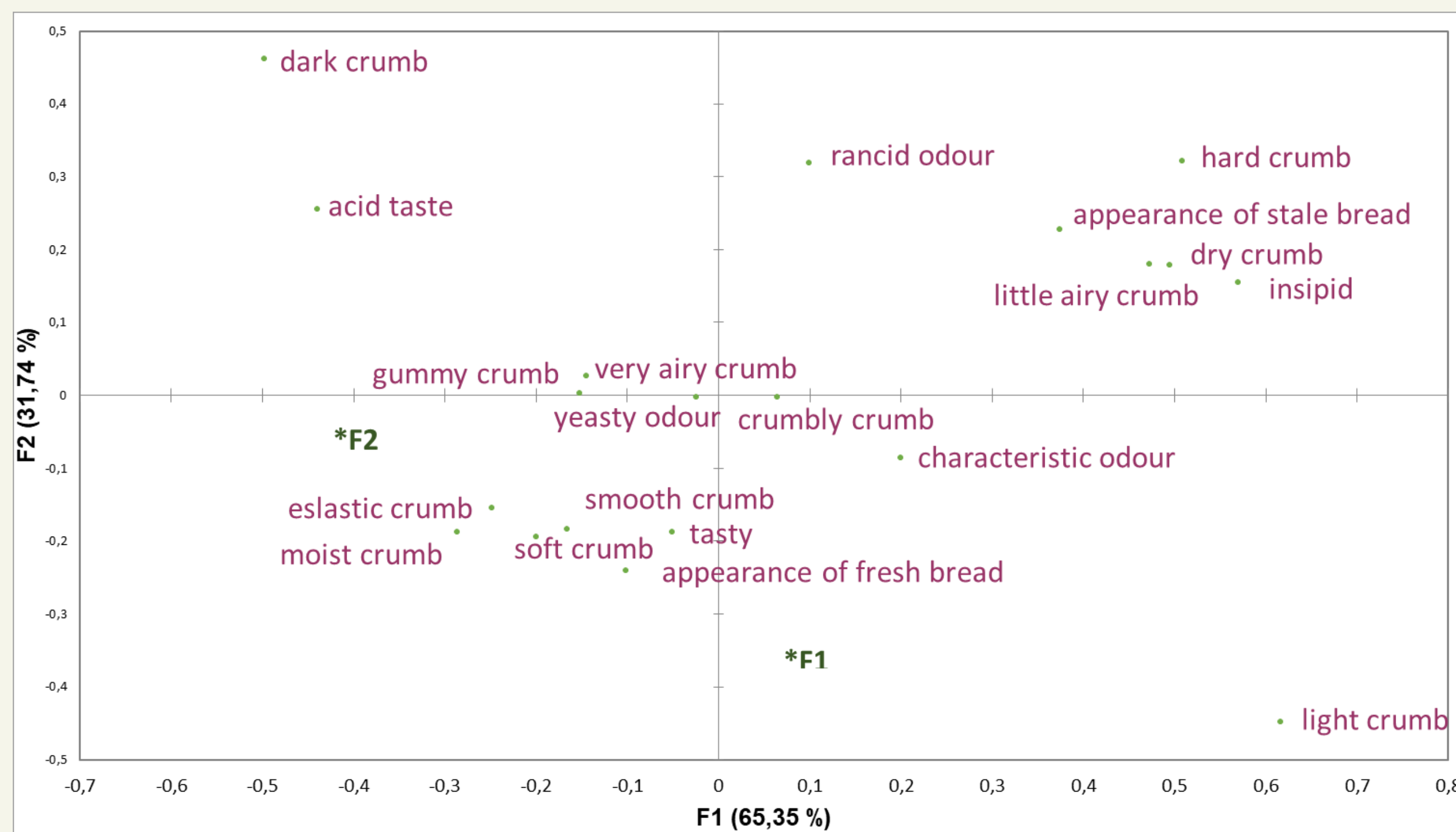


Figure 1. Descriptive sensory map of the Correspondence Analysis of the CATA data.

Conclusion

These findings support the potential use of *N. affinis* powders as a sustainable and functional ingredient to enhance nutritional and sensory quality of GF breads.

References

Esposito NN, Dawidowicz K, Martí-Quijal FJ, Castagnini JM, Brelis LE, Sanchez R, Buera MDP, Busch VM, Genevois CE. Physicochemical, Nutritional and Functional Properties of *Neltuma affinis* Pod Powders: a Novel Ingredient for Food Applications. *Plant Foods Hum Nutr.* 2025 Sep 5;80(3):153. doi: 10.1007/s11130-025-01396-7. PMID: 40911093.

Figure 2: Penalty analysis of F1 (a) and F2 (b)